Education and Science

Vol 39 (2014) No 176 199-211

Adaptation of the Students' Perceptions of the Science and Technology Course Classroom Assessment Environment Scale into Turkish *

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Abstract

The purpose of this study is to adapt the Students' Perceptions of the Classroom Assessment Environment Scale (SPCAES) which was developed by Alkharusi (2011) into Turkish. The participants consist of 305 seventh and eighth grade elementary school students. At the first stage of the study, the linguistic validity of the translated scale was explored. Upon satisfaction of the linguistic validity requirements, exploratory factor analysis and confirmatory factor analysis were performed in order to examine the construct validity of SPCAES. The reliability of the SPCAES is investigated by calculating the Cronbach alpha reliability coefficients. Corrected item-total correlations and t-tests between the upper 27% and the lower 27% groups, in terms of item means, were used to check the item discrimination index. The findings of this study indicate that the Turkish PCAES is a valid and reliable research instrument for Turkish students.

Keywords

Classroom assessment environment
Scale adaptation
Science and Technology course
Elementary education
Factor analysis

Article Info

Received: 06.30.2014
Accepted: 10.30.2014
Online Published: 12.16.2014

DOI: 10.15290/EB.2014.3729

Introduction

Defined as the process of collection, analysis and interpretation of the qualitative and quantitative data for the purpose of decision making about the students and educational processes (Cizek, 1997; McMillan, 1997), assessment activities play an important role in the development and improvement of the educational systems. Defining the assessment activities as a systematic process, Miller, Gronlund & Linn (2009) pointed out that these processes are very important for effective instruction because assessment is a process of determining what the students know, what they are capable of doing and what they are interested in (Huffman, 1995). Therefore, it has a strong effect on students' various affective and cognitive characteristics, such as their learning approaches (Biggs, 2003; Hamdorf & Hall, 2001), their motivations and achievement goal orientations (Ames, 1992; Brookhart, 1997), their academic achievement and attitudes (Taş, Karakaya, Çetinkaya & Apaydın, 2013). In this regard, assessment has an important role in the learning process and likewise in the teaching methods (Brown, Rust & Gibbs, 1994; Scouller, 1998). In other words, it is an inseparable part of the education process (Linn, 1990). As a component of the education process, assessment activities are shaped through the teachers' practices in the classroom. The assessment techniques used by the teachers, the frequency of the assessment activities, the feedback given to the students and the

* This study is a part of first authors' PhD thesis, supervised by 2nd author.
This study is supported by the Scientific Research Project Fund of Cumhuriyet University under the project number EGT 027.
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presentation of the assessment results constitute an assessment environment for every classroom. In this sense, Brookhart (2004) states that each classroom has an assessment "character" or "environment" sourced from the teachers' assessment practices. Assessment activities conducted by the teachers to evaluate the students create a classroom assessment environment for each course.

Classroom Assessment Environment

"Classroom Assessment Environment" is a relatively novel concept for national literature and it was first defined in international literature by Stiggins & Conklin (1992). Accordingly, classroom assessment environment can be expressed as an environment which is shaped by the teacher's assessment activities and experienced in a variety ways by the students. More clearly, classroom assessment environment can be stated as an environment which is experienced by the students in different ways in accordance with the teacher's assessment activities such as the determination of assessment purposes and tasks, organization of the assessment criteria and standards, providing feedback and presenting the assessment results (Brookhart, 1997). Conceptualizing the classroom assessment environment for the first time, Stiggins & Conklin (1992) focused on the teachers' practices rather than the students' perceptions about this environment. However, addressing the classroom assessment environment once again, Brookhart (1997) redefined this concept in consideration of the literature related to the assessment and motivation. She developed a theoretical model based on the social-cognitive theories about the learning and motivation and the relevant literature about the assessment (Alkharusi, 2011).

In her theoretical model, Brookhart (1997) states that the classroom assessment environment is affected by four basic factors and is shaped by these factors. These factors are; teachers' attitudes, philosophy and beliefs towards the teaching-learning process and students, teachers' training and their knowledge levels and skills about the assessment, classroom climates and institutional policies. Brookhart (1997) indicates that these factors affect teachers' choices of various classroom assessment environment components. Reflecting the instructional process at the same time, the classroom assessment environment is composed of teachers' selections of the type, frequency, instructional tasks and feedback of the assessment. These choices also reflect the teachers' field knowledge, their knowledge about the students and assessment principles, their instructional activities and their interaction with students.

Stiggins & Conklin (1992) argue that the classroom assessment environment has eight components. These components are; assessment purposes, assessment methods, the criteria used in the selection of assessment methods, the quality of assessment, feedback given, teacher as an assessor, teachers' perceptions of the students, and assessment-policy environment. Brookhart (1997) expresses that the classroom assessment environment consists of five elements. These elements are the purpose of the assessment, the selection of assessment methods, organization of assessment criteria and standards, giving feedback and presentation of the assessment results. Along with the effects of these five elements which can vary according to the teachers' practices, different assessment environments are perceived by the students.

The Types of Perceived Classroom Assessment Environment

In the review of the literature about the types of classroom assessment environments, it is observed that the researchers argue different categorizations related to the types of classroom assessment environments (Alkharusi, 2007; Alkharusi, 2011; Wang, 2004). Wang categorized the classroom assessment environment into three groups, which are learning-oriented, test-oriented and praise-oriented. On the other hand, Alkharusi (2007) categorized the classroom assessment environment into three groups which are learning-oriented, harsh-oriented and public-oriented. But when some educational perspectives and relevant studies about the classroom assessment environment are reviewed (Ames, 1992; McMillan & Workman, 1998), it is realized that the classroom assessment environment is generally conceptualized in two categories as learning-oriented and performance-oriented (Alkharusi, 2011).

This categorization corresponds to achievement goal orientation categories which explain the students' perceptions about the classroom or school activities and was developed for the purpose of explaining the students' achievement goals during the teaching-learning process (Ames & Archer, 1988). Actually, it isn't coincident because there is a strong relationship between the students' perceptions about the classroom assessment environment and their achievement goal orientations (Ames, 1992; Brookhart, 1997). This strong relationship is emphasized by both achievement goal orientation theorists and classroom assessment environment theorists.

When the dual categorization is reviewed, in the general sense, learning-oriented classroom assessment environment refers to assessment tasks which are meaningful for the students and help them increase their achievement levels and to an assessment environment which informs them about their performances and help them improve their performances (Alkharusi, 2011). In this type of assessment environment, students' learning is focused and assessment practices are used to improve the students' performances (Wang, 2004). As for the performance-oriented classroom assessment environment, it reflects an assessment environment where the difficult and meaningless assessment tasks, assessment criteria and standards hard to achieve and the grades rather than the learning are important, and where the students are consistently compared to each other (Alkharusi, 2011). In this type of assessment environment, the exams are important and the focus is on students' scores (Wang, 2004). As can be seen, in fact, this dual categorization corresponds to two different views about the assessment practices argued by Stiggins (2002). In this regard, in learning-oriented classroom assessment environments, the notion of "assessment for learning" and in performance-oriented classroom assessment environments, the notion of "assessment of learning" are dominant.

The Significance of the Research

It has been reported in various studies that students' views and perceptions about the assessment, and their achievements (Koop, 1998), their motivation's (Ames, 1992; Brookhart, 1997) and their learning approaches (Struyven, Dochy, & Janssens, 2002) are related. For this reason, it is important to determine the students' perceptions about the assessment. From the review of the literature, it can be seen that there are many studies investigating the relationship of the students' perceptions about the classroom assessment environment and the assessment techniques with their some affective properties, such as motivation, achievement goal-orientation and self-efficacy (Alkharusi, 2007; Brookhart & Durkin, 2003; Hanckok, 2007; Maslovaty & Kuzi, 2002; Stefanou & Parkes, 2003; Wang, 2004).

The results of the studies in the literature show that the classroom assessment environment has a strong effect on the students' motivational beliefs (Alkharusi, 2007; Brookhart & Durkin, 2003; Hanckok, 2007). While the concept of classroom assessment environment holds an important place in international literature and there are many studies related to this concept, no study about this topic is encountered in national literature. On the other hand, it is observed that there isn't a scale to measure the elementary students' perceptions about the classroom assessment environment in the national literature. In this sense, this study is aimed to contribute to the literature due to the absence of a scale aiming at measuring the students' perceptions about the classroom assessment environment in the present literature.

The Purpose of the Study

The aim of this study is to present a scale revealing the students' perceptions about the classroom assessment environment within the scope of Science and Technology course to the literature. Since adaptation of a scale has many advantages compared to developing it (Hambleton & Patsula, 1999), it is intended to adapt the "Students' Perceptions of the Classroom Assessment Environment Scale" (SPCAES) developed by Alkharusi (2011) into Turkish and perform the validity and reliability analyses in this study.

Method

Participants

The participants of this research were composed of 305 students, of whom were 7th and 8th graders in four different elementary schools in Spring Semester of 2011-2012 academic year. The participants were selected via convenience sampling technique. 51% of the participants were 7th graders and 49% of them were 8th graders. Moreover, 53% of the participants (n=162) were male and 57% (n=143) were female. Along with the suggestion of having a sample that is at least 5 or 10 times of the number of scale items for conducting a factor analysis (Cattell, 1978; Everitt, 1975; cited: Mundfrom, Shaw & Lu Ke, 2005), at least 200 participants are advised (Pallant, 2007). Also, Field (2005) states that a sample composed of 300 participants is sufficient for factor analysis. With reference to the literature and in light of the statistical findings which will be presented in detail in the findings section, it was decided that a sample of 305 participants was sufficient for validity and reliability analyses.

Students' Perceptions of the Classroom Assessment Environment Scale (SPCAES)

Developed by Alkharusi (2011) to determine the students' perceptions about the classroom assessment environment, the SPCAES was composed of 16 items which are 5 point Likert scale. There were 9 items in the first factor and it was named as "Learning-Oriented Assessment Environment". The second factor consisted of 7 items and it was named as "Performance-Oriented Assessment Environment". Internal consistency coefficients of the factors were calculated as .82 and .75, respectively. On the other hand, total variance ratios accounted by the factors were 29.19% and 12.71%, respectively and the total variance accounted by the scale was 41.90%.

Procedure

Before beginning the adaptation of the SPCAES into Turkish, the developer of the scale, H. Alkharusi was contacted through e-mail and his opinions about the adaptation of the scale into Turkish within the Science and Technology course and his permission were obtained. Afterwards, the adaptation of the scale was carried out in accordance with the eight steps presented by Şeker and Gençdoğan (2006).

In the first step, the English form of the scale was translated into Turkish by three different interpreters. In the second step, these translated forms were reviewed by the researcher and a Science education specialist, and a Turkish form was constituted in accordance with the suggestions. The Turkish form and the original English form were sent to two different specialists and the Turkish form was edited according to their opinions. In the third step, the Turkish form was translated into English by a advanced level English specialist. In the fourth step, the translated forms were compared and the Turkish form was edited again. In the fifth step, the English and Turkish forms were administered to 40 students from English Language and Literature department within a range of one week. In the sixth step, the correlation coefficient between the scores from Turkish and English forms was calculated. In the seventh step, two Science teachers were interviewed in terms of the scale's face validity. In line with the suggestions, necessary edits were done. After the edit, a focus group discussion was conducted with 20 seventh graders, whether the items were clear or not was checked and their views were collected about the incoherent parts. After the edit in line with the suggestions, the scale was sent to two specialists on Turkish Language and its linguistic accuracy was checked.

Finally, the scale was conducted with elementary students and the data was obtained from the pilot study.

The ethical principles related to the studies with human participants were paid attention during the scale adaptation process. In this regard, it was made sure that the participants received no psychological harm by the test items, and that the participants didn't feel under pressure and gave independent answers under no external influence (Tolun, 2008). On the other hand, another ethical principle of scale adaptation is to use the original title of the scale (Sümer, 1998). This ethical principal was paid regard and no change was made in the title of the scale. Also, the necessary permission from the authors was granted. It was explained to the participants that completing the scale wouldn't have an effect on their course grades and their personal information would be used only for the sake of the research and they would be kept confidential. Moreover, it was asked from the participants not to write their names on the scale.

Data Analysis

In order to check the linguistic validity of the scale, the correlation between the Turkish and English forms conducted within a range of one week was calculated using the Pearson product-moment correlation coefficients. In order to determine the construct validity of the scale, an explanatory factor analysis (EFA) was performed. The structure of the factors during EFA was determined by rotated principal components analysis. The factor construct determined by EFA was subjected to confirmatory factor analysis (CFA). During the CFA which helps the determination of item-factor relations and the relation between the factors, in order to evaluate the validity of the model, Chi-Square Fit, GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), RMSEA (Root Mean Square Error of Approximation), CFI (Comparative Fit Index), NFI (Normed Fit Index), RMR (Root Mean Square Residual) fit indexes were used. The internal reliability coefficients of the factors were calculated using the Cronbach α value. With the aim of determining how adequate each item was in differentiating the participants in terms of the characteristic it measured and determining the reliability of the dimensions identified by CFA, item-total correlations were calculated first. Secondly, with the aim of testing the significance of the difference between the lower-upper 27% groups, a t-test was used. In order to reveal the relationship between the factors, the correlation between two factors' scores was determined using the Pearson product-moment correlation coefficient.

Findings

Findings on Linguistic Validity

The correlation coefficients, calculated in accordance with the scores obtained in Turkish and English forms by the 40 students who were included in the research for the linguistic validity and who study at the department of English Language and Literature, between the two factors are .94 and .82, respectively. The correlation values show that the Turkish form is equivalent to the original form.

Findings on Exploratory Factor Analysis (EFA)

Before the factor analysis of SPCAES, with the intent of determining whether the data fit the factor analysis or not, Kaiser-Meyer-Olkin coefficient (KMO) and Bartlett's test of sphericity were performed. KMO coefficient was higher than .60 and Bartlett's test result was statistically significant; therefore, the data provided good fit for factor analysis (Büyüköztürk, 2008). In the research, the scale's KMO value and Bartlett's test of sphericity was found as .83 and [$\chi 2$=959.20 (p<.01)], respectively. In line with these findings, it was decided that the data provided a good fit for factor analysis. Since the items were gathered under two factors in the original scale, the EFA was conducted as the scale having two factors. Considering the scree plot graph, eigenvalues and total variance rate accounted, factor loadings were calculated by varimax method in the analysis. Lower limit of the item loadings was determined to be .30 and the items having loads less than .30 were excluded from the scale. As a result of the analysis, an item (I_7) with a loading less than .30 was detected to be removed. Similarly, during the calculation of the items' internal reliability, it was observed that the same item decreased the reliability of the scale, and as a consequence, it was removed. At the end of the analysis, it was observed that there was no overlapping item and as can be seen in scree plot graph in Figure 1, the scale had two factors, each of whose eigenvalues were higher than 1.

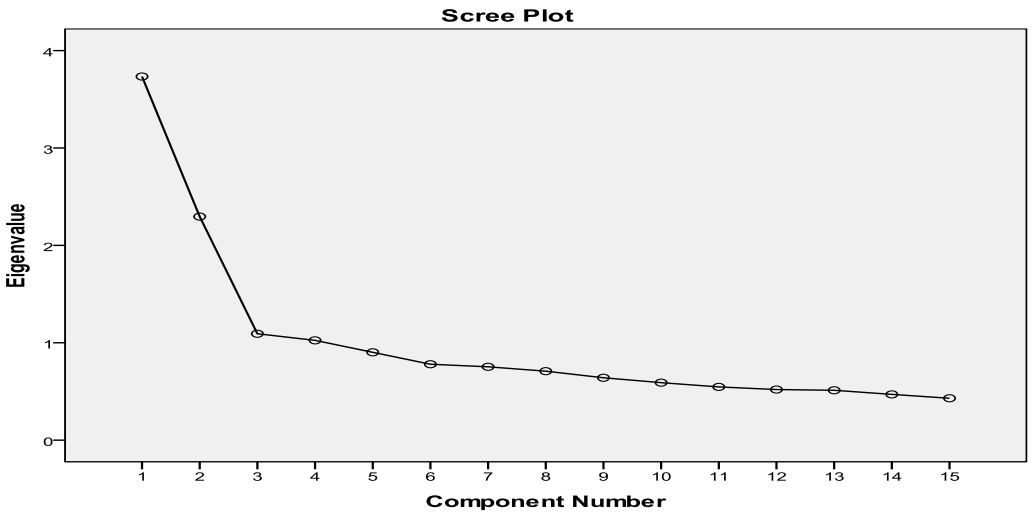

Figure 1. Scree Plot Graph of the SPCAES Factors

The EFA finding of SPCAES is demonstrated in Table 1.

Table 1. The EFA Findings of SPCAES

Item no	Statement	Factor 1 Learning-oriented assessment environment	Factor 2 Performance-oriented assessment environment
I1	In this class, students can find out their strengths in Science.	.612	
I3	In this class, the assignments and tests encourage thinking.	.587	
I5	In this class, students are given a chance to correct their mistakes.	.612	
I8	In this class, the instructor uses a variety of ways (e.g., tests, in-class tasks, homework assignments…etc) to assess our mastery of the learned subject materials.	.692	
I11	In this class, the teacher holds us the responsibility to learn.	.595	
I12	In this class, students receive continuous feedback from the teacher about their performance in Science.	.694	
I13	In this class, the assignments and activities are related to students' everyday lives.	.415	
I15	In this class, the teacher helps us identify the places where we need more effort in future.	.670	
I2	In this class, the assessment results do not fairly reflect the effort put in studying the subject.		.657
I4	In this class, there is a mismatch between the learned subject materials and the assigned homework and tests.		.603
I6	In this class, the in-class and homework assignments are not interesting.		.662
I9	In this class, the teacher gives more importance to the grades than to the learning.		.646
I10	The tests and assignments in this class are difficult to students.		.512
I14	In this class, the teacher compares students' performances to each other.		.658
I16	In this class, the teacher's grading system is not clear.		.623
Explained variance (%) total = 40.20		**24.89%**	**15.31%**

Findings on Confirmatory Factor Analysis (CFA)

With the use of CFA which aims at investigating to what extent a pre-determined structure is confirmed by the data obtained (Büyüköztürk, Akgün, Kahveci & Demirel, 2004), the construct with two factors obtained by EFA was analyzed. The fit indexes of the SPCAES calculated by the CFA and the indexes accepted in the relevant literature are presented in Table 2.

Table 2. The CFA Findings of SPCAES

CFA Fit Index		Results of study	Good Model Criteria's (Çokluk, Şekercioğlu & Büyüköztürk, 2010)
Chi-Square/Degrees of Freedom	χ^2/sd	170.29/89=1.91	< 3
Goodness of Fit Index	GFI	.93	≥ .90
Adjusted Goodness of Fit Index	AGFI	.91	
Non-normed of Fit Index	NNFI	.94	
Comparative of Fit Index	CFI	.95	
Standardized Root Mean Squared Residual	SRMR	.06	≤ .08
Root Mean Square Error of Approximation	RMSEA	.05	≤ .08

As can be viewed in Table 2, it is observed that the some of the fit indexes are excellent (χ^2/sd, GFI, AGFI, CFI, NNFI, SRMR) and some of them are good (RMSEA) when the fit indexes obtained in the research and the values accepted in the literature are compared. These fit indexes show that the model is acceptable. Moreover, when the t values for each item is examined, it is determined that all of the items are significant (p<.01). These results show that the model has a good fit with the data. The path diagram demonstrating the standardized coefficients between item-implicit variable and implicit variables are presented in Appendix 1.

Findings on the Internal Consistency Reliability

Cronbach α internal reliability coefficient was calculated with the aim of determining the internal consistency of SPCAES. As a result of the analysis, coefficient values were .74 for both "Learning-Oriented Assessment Environment" factor and "Performance-Oriented Assessment Environment" factor.

Findings on the Discrimination Index of the Items

With the aim of determining how adequate each item was in differentiating the participants in terms of the characteristic it measured and determining the reliability of the dimensions identified by CFA, item-total correlations were calculated. Afterwards with the aim of determining the significance of the difference between the lower-upper 27% groups determined by the total score, a t-test was used. The results are presented in Table 3.

Table 3. Corrected Item-Total Correlations of the Factors of SPCAES, Item-Total Correlations and Unrelated t test Results Between Higher 27% and Lower 27% scores

Item No	Corrected item-total correlation	t values for items (higher 27%-lower 27%)	Item No	Corrected item-total correlation	t values for items
Learning-oriented assessment environment			**Performance-oriented assessment environment**		
1	.45	10.647*	2	.50	10.252*
3	.45	10.610*	4	.45	11.159*
5	.46	10.683*	6	.49	17.389*
8	.55	10.586*	9	.50	12.414*
11	.41	9.619*	10	.33	9.554*
12	.54	12.796*	14	.48	10.473*
13	.26	12.508*	16	.46	11.335*
15	.53	10.180*			

*p<.01

According to the Table 3, item-total correlations varied between .26 and .55. It was observed that the differences were significant for all items in the findings obtained from the t-test between lower-upper 27% groups' item averages. This finding showed that all of the items in the scale were discriminative.

Findings on the Relationship between the Factors

The average and standard deviations of the scale's two factors can be viewed in Table 4.

Table 4. The Average and Standard Deviations of the SPCAES's factors' and the Inter-Factorial Correlation Values

		M	sd	Correlations**	
	Factors			**1**	**2**
1	Learning-oriented assessment environment	4.30	0.52	-	.187
2	Performance-oriented assessment e environment	2.30	0.79		-

As can be seen in Table 4, when the correlation between the factor scores were examined, Correlation coefficient was found to be smaller than .30, which indicates that the factors of the scale are independent constructs.

Discussion, Conclusion and Suggestions

Within the scope of this study, the Turkish adaptation, validity and reliability studies of SPCAES developed by Alkharusi (2011) with the aim of determining the students' perceptions on the classroom assessment environment in Science and Technology course was performed. With the aim of determining the validity and reliability of the Turkish form, linguistic validity, construct validity, discriminative ability of the items and correlation coefficients between the factors of the scale was investigated. Moreover, the internal reliability coefficients of the factors were calculated via Cronbach α value. As a result, it was determined that the two factor structure of the Turkish scale in Turkish population provided a good fit with its original form. However, while the original scale had 16 items, an item was excluded during the adaptation process since it contributed to both factors at the same time in EFA and it decreased the internal consistency coefficient. As a result, SPCAES was decided to be composed of 15 items and two factors. The first factor consisting of 8 items was named as "Learning-Oriented Assessment Environment" and the second factor consisting of 7 items was named as "Performance-Oriented Assessment Environment".

The assessment activities performed during the instruction process affects both the quality of the instruction and the students' motivational beliefs (Brookhart, 1999). For this reason, the students' perceptions on the classroom assessment environment created by the teachers' assessment practices has many effects on students' some characteristics such as their achievement-goal orientations (Ames, 1992; Brookhart, 1997), their learning styles (Biggs 2003; Hamdorf & Hall 2001; Struyven, Dochy, & Janssens, 2002) and their achievements (Koop,1998). The results of the studies in literature also reveal this effect (Alkharusi, 2007; Brookhart & Durkin, 2003; Hanckok, 2007; Maslovaty & Kuzi, 2002; Stefanou & Parkes, 2003; Wang, 2004). On the other hand, while there are many studies on the teachers' opinions about assessment practices in Turkey especially after the curriculum change in 2004-2005 academic year (Birgin, 2010; Gelbal & Kelecioğlu, 2007; Metin & Birişçi, 2011), the number of studies on students' assessment activities and their perceptions on the classroom assessment environment originating from these activities are insufficient. Moreover, there is no study focusing on students' perceptions on the classroom assessment environment. Therefore, within the scope of this study, both the concept of classroom assessment environment was introduced and a scale which could be used to determine the students' perceptions on the classroom assessment environment was adapted into Turkish.

Science and Technology Course Students' Perceptions of the Classroom Assessment Environment Scale can be used in research studies aiming at determining the students' perceptions on the classroom assessment environment. In this way, it is possible both to determine the students' perceptions on the assessment activities conducted in classroom and to investigate the relationship between their perceptions and some affective and cognitive characteristics. By this way, the effects of instructional activities and especially the assessment activities on the students can be revealed. On the other hand, this scale used within the scope of Science and Technology course can be adapted into other course and can be used.

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Appendix 1. The path diagram showing standardized coefficients between item-latent variable and latent variables